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FLUOR DANIEL, INC.

Date: March 29, 1993

Reference: Hanford Waste Vitrification Plant  
DOE Contract DE-AC06-86RL10838  
Fluor Contract 8457

Transmittal No.: WDOE-379

Dear Mr. Grantham:

TRANSMITTAL

We enclose   \*   copy of the items listed below. These are issued per US-DOE request.  
\*2 SPECIFICATIONS

Response due to Fluor:   N/A    
Responds to:   P27A PACKAGE  

NUMBER	REV	DATE	TITLE
B-595-P-27A SECTION 16482	1	03/26/93	P27A PACKAGE MOTOR CONTROL CENTERS

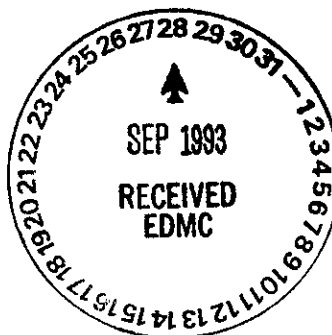
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(MSIN H6-08), w/1 SPEC  
D. Duncan, US EPA, Region X w/o

Very truly yours,

*Rosalie Cadenas for*  
R. S. Poulter  
Project Director

*MHF*  
RSP:MHF:lt



U.S. DEPARTMENT OF ENERGY  
Hanford Waste Vitrification Plant  
Richland, Washington  
DOE Contract DE-AC06-86RL10838

FLUOR DANIEL, INC.  
Advanced Technology Division  
Fluor Contract 8457

MOTOR CONTROL CENTERS  
SPECIFICATION B-595-P-P27A

APPROVED FOR CONSTRUCTION

REVISION 1 PER CR-854

ISSUE DATE 3/26/93

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# **SPECIFICATIONS**

## **MOTOR CONTROL CENTER B-595-P-P27A**

### **HANFORD WASTE VITRIFICATION PLANT**

**U.S. DEPARTMENT OF ENERGY  
RICHLAND OPERATIONS OFFICE**



**FLUOR DANIEL  
ADVANCED TECHNOLOGY DIVISION  
CONTRACT 8457**

**DOE CONTRACT NO.  
DE-AC06-86RL10838**

U.S. DEPARTMENT OF ENERGY  
Hanford Waste Vitrification Plant  
Richland, Washington  
DOE Contract DE-AC06-86RL10838

FLUOR DANIEL, INC.  
Advanced Technology Division  
Fluor Contract 8457

Rev. 1

**MOTOR CONTROL CENTERS  
SPECIFICATION B-595-P-P27A**

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**DIVISION 16 - ELECTRICAL**

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U.S. DEPARTMENT OF ENERGY  
Hanford Waste Vitrification Plant  
Richland, Washington  
DOE Contract DE-AC06-86RL10838

FLUOR DANIEL, INC.  
Advanced Technology Division  
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SECTION 16482  
MOTOR CONTROL CENTERS  
B-595-P-P27A-16482

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WAPA YES     NO X  
QUALITY LEVEL I     II X  
SAFETY CLASS 1     2     3 X 4    

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SECTION 16482  
MOTOR CONTROL CENTERS  
B-595-P-P27A-16482

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<u>ATTACHMENT</u>	<u>TITLE</u>
A	MCC COMPONENTS LIST
B	STARTER DIAGRAMS

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**SECTION 16482  
MOTOR CONTROL CENTERS**

**PART 1 GENERAL**

**1.1 SUMMARY**

- 1.1.1 This specification describes the technical requirements for the design, fabrication, inspection, testing, and delivery of free-standing Motor Control Centers (MCC).
- 1.1.2 This specification supplements Attachments A and B on which specific requirements are listed in detail. Whenever there is a conflict between this specification and the attachments, the latter shall govern.

**1.2 REFERENCES**

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

**NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)**

NEMA AB 1	1986 Molded Case Circuit Breakers and Molded Case Switches
NEMA ICS 2	1988 Industrial Control Devices, Controllers and Assemblies
NEMA ICS 4	1983 Terminal Blocks for Industrial Use
NEMA ICS 6	1988 Enclosures for Industrial Control and Systems (Rev. 1 - 1989)
NEMA 250	1985 Enclosures for Electrical Equipment (1000 Volts Maximum)

**NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)**

NFPA 70	1990 National Electrical Code (NEC)
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**UNDERWRITERS LABORATORIES, INC. (UL)**

UL 489	1986 Molded-Case Circuit Breakers and Circuit Breaker Enclosures
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UL 845 1988 Standard for Safety Motor Control Centers

UL 508 1989 Industrial Control Equipment  
Fifteenth Edition, October 19, 1990

UL 1059 1988 Terminal Blocks

### 1.3 RELATED REQUIREMENTS

Specification Section 01730 Operation and Maintenance Data

### 1.4 DEFINITIONS

FAT - Factory Acceptance Test

MCC - Motor Control Center

### 1.5 SYSTEM DESCRIPTION

Motor control centers shall be a part of 480/277 vac, 3 phase, 4 wire, 60 Hz, grounded distribution system for the Hanford Waste Vitrification Plant (HWVP).

### 1.6 SUBMITTALS

Submit the following in accordance with the Vendor Drawing and Data Requirements section of the Order/Subcontract.

#### 1.6.1 Data Sheets and Shop Drawings

1.6.1.1 Dimensional plan and front elevation of each motor control center.

1.6.1.2 Conduit entrance locations and dimensions for both top and bottom entries to MCCs.

1.6.1.3 Detail drawings, as required, showing mounting details. A section view including wiring trough location dimensions, assembly of starter unit demonstrating accessibility of equipment and terminals.

1.6.1.4 Bolted connection between shipping sections to be installed during field assembly.

1.6.1.5 Neutral and ground bus connections.

1.6.1.6 Weight of equipment for each shipping section.

1.6.1.7 Elementary diagrams of individual cubicle units, including terminal numbers.

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1.6.1.8 Nameplate drawings.

1.6.1.9 Connection diagrams of individual cubicle units and MCC space heaters.

1.6.2 Material List

Material list shall be furnished for each motor control center listing the quantity, type, rating and manufacturer's catalog number of all equipment in each unit.

1.6.3 Spare Parts List

A list of manufacturer's recommended spare parts for start-up and one (1) year's operation. Include sufficient data to permit procurement from the original manufacturer or any subsupplier.

1.6.4 Installation, Operating, and Maintenance manuals shall be in accordance with Specification Section 01730 and shall include:

1.6.4.1 Storage, installation, operating, and maintenance instructions shall cover all the equipment furnished including procedure for field connections between shipping sections and bolt torquing values.

1.6.4.2 Operating and maintenance instructions shall include technical data on motor starters, auxiliary relays, contactors, overload relay selection table and time-current curves of each different molded case circuit breaker.

1.6.5 Shop Inspection and Testing Reports

Inspection and certified test reports in accordance with Paragraph 2.2.

1.6.6 Factory Acceptance Test (FATs) procedures, for Buyer's review, for all tests specified in Paragraph 2.2.3.

1.6.7 Recommended field acceptance test procedures.

1.6.8 Rating Certification

Seller shall provide certification that equipment is rated for continuous operation in the environmental conditions defined in this specification.

1.6.9 Underwriters Laboratories Listing

A copy of the UL listing card showing compliance with applicable UL standards as listed in this specification.

1.7 CLASSIFICATION OF SYSTEM AND COMPONENTS

(Not Used)

1.8 PROJECT OR SITE ENVIRONMENTAL CONDITIONS

1.8.1 Climatic and Geographic Site Conditions

A. Site Elevation 714 feet above sea level

B. Barometric Pressure 14.3 psia

C. Outside Design Temperature

1) Maximum Design Temperature 110°F

2) Minimum Design Temperature -20°F

1.8.2 Operating Environment

Indoor Temperature 65°F to 104°F

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

2.1.1 General

2.1.1.1 The motor control centers shall consist of one or more manufacturers' standard prefabricated vertical sections comprising individual control units arranged to provide a completely dead-front totally enclosed assembly.

2.1.1.2 The motor control centers shall be NEMA Class 1, Type B wiring per NEMA ICS2, Part ICS2-322. MCC cubicles shall be equipped as noted on Attachments A and B. All equipment shall be fabricated of new materials.

2.1.1.3 Where applicable, materials and components within motor control centers shall be listed by Underwriters Laboratories and bear the UL label.

2.1.1.4 Internal components shall be securely anchored to their containing cubicle by self-tapping screws.

2.1.1.5 When two or more components of the same specifications are required, the components shall be identical, i.e. same manufacturer and catalog number.

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2.1.2 Enclosures

- 2.1.2.1 Outside joints shall present a smooth finish. The vertical sections shall be minimum of 20 inches deep. MCC shall be arranged for front mounting and front maintenance.
- 2.1.2.2 When starter or breaker "Spaces" are indicated on Attachment A, they shall be supplied complete with guide rails, plug-in connections, and blank cover plates ready for installation of starter or breaker units with a minimum amount of field labor.
- 2.1.2.3 The enclosure shall be NEMA type 1 gasketed per NEMA Standard 250 and constructed in a manner that will permit end to end placement against similar control centers with no interferences because of bolts, nuts, and cover plates. The enclosure, including supporting frame structure and surface sheet metal thickness, shall conform to NEMA ICS 6 and UL 845. The starter NEMA sizes and/or circuit breakers ratings for each motor control center cubicle shall be as shown on Attachment A.
- 2.1.2.4 MCC incoming line compartment shall be arranged for conduit entry from the bottom. The cable lugs shall be installed at the top portion of the compartment for terminating incoming cables entering from below. Minimum distance from the bottom of the MCC to the centerline of the cable lugs shall be 3'-0".
- 2.1.2.4.1 Main incoming supply cables shall enter MC-32A-205 in the extreme right vertical section when viewed from the front of the assembly.
- 2.1.2.4.2 Main incoming supply cables shall enter MC-32B-205 in the extreme left vertical section when viewed from the front of the assembly.
- 2.1.2.4.3 Maximum overall space requirements for MCC assembly MC-32A-205 shall be 100 inches wide, 20 inches deep and 90 inches high.
- 2.1.2.4.4 Maximum overall space requirement for MCC assembly MC-32B-205 shall be 80 inches wide, 20 inches deep and 90 inches high.
- 2.1.2.5 A clear opening at the incoming line section shall be provided for the entrance of conduits. The minimum dimensions for this opening shall be 13-1/2 inches front to back and 17-1/2 inches side to side. The opening shall be centered on the floor plan of the vertical section.
- 2.1.2.6 MCC sections shall be arranged for all outgoing feeder cables exiting the MCC from the top.
- 2.1.2.7 The base of each vertical section shall be reinforced with provisions made for welding each corner of each vertical section base to the Buyer's embed channels with 3/16 inch fillet welds, minimum 3 inches long.

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- 2.1.2.8 Barriers or baffles shall be provided to prevent an arc from leaving the compartment in which it originates and in any way damaging devices, wiring, or other equipment outside the compartment.
- 2.1.2.9 The structure and bus arrangement of the MCC shall be such that it can be expanded on both ends.
- 2.1.3 Bus Structure
- 2.1.3.1 Each MCC vertical section shall contain a three phase vertical bus with minimum rating as shown on Attachment A. Seller shall determine if higher bus rating is required by starter rating and arrangement. For the incoming line section, vertical bus shall be same rating as the horizontal bus.
- 2.1.3.2 The main bus shall be rated as shown on Attachment A. The maximum temperature of motor control center phase bus bars shall be 50°C rise over maximum ambient per Paragraph 1.8 at full load and rated voltage. The specified bus rated currents are exclusive of any derating factors required by applicable codes and standards, NEMA ICS 2, and UL 845. Phase, neutral and ground buses shall be copper.
- 2.1.3.3 Phase buses and the neutral bus shall be insulated from the enclosing structure and braced for short circuit values shown on Attachment A. Bus support insulators shall be flame retardant, non-arc tracking, with mechanical and dielectric strength to withstand the stresses of the indicated fault current. The use of padding material between insulators and bus is not acceptable.
- 2.1.3.4 Copper bus bar connections shall be equivalent to a minimum overlap of a full bus bar width. The entire overlap surface of each joint shall be silver plated. Points of connection for control units and disconnecting devices shall be silver plated.
- 2.1.3.5 There shall be a minimum clearance in air of 1 inch between phases and between phase and ground. The buses shall be arranged to provide a phasing of A-B-C, left to right, front to back, top to bottom, when viewed from the front of the motor control center. All buses shall be accessible from the front of the assembly.
- 2.1.3.6 The main bus shall be drilled and provided with crimp-type two-hole, long barrel copper terminals for incoming power cables sizes as indicated on Attachment A.
- 2.1.3.7 The motor control center shall have a 300A capacity copper neutral bus extending the entire length of the structure. Bus shall be provided with crimp-type two-hole, long barrel copper terminals for incoming neutral cables as indicated on Attachment A.

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- 2.1.3.8 Each motor control center shall have a 1/4-inch by 1-inch copper bar ground bus extending the entire length of the structure and shall have quantity and size of crimp-type copper terminals at incoming end as indicated on Attachment A. Bus shall be provided with crimp-type copper terminals for individual ground cables as indicated on Attachment A.
- 2.1.4 Wireway
- 2.1.4.1 Each vertical section shall be provided with wireway at the top and bottom. Top wireway shall be located forward from the bus and shall be separated from it by means of a removable barrier. Minimum of 12 inches height shall be provided for outgoing cables at the top.
- 2.1.4.2 Full height vertical wiring channels shall be provided for power and control wiring. Vertical wiring channels shall be free of the live parts and shall be covered by its own door.
- 2.1.4.3 The horizontal wireways shall be enclosed by screw cover panels.
- 2.1.5 Motor Starters
- 2.1.5.1 Motor starters shall be full voltage non-reversing (FVNR). Each combination starter shall be housed in an individual compartment and in accordance with UL 508. The units shall be readily removable from the front by disconnecting the necessary control and load leads. It shall be possible to remove any unit without opening adjacent compartment doors, disconnecting adjacent equipment or in any manner disturbing the operation of any other unit in the control center. Each unit shall have devices to assure accurate mechanical alignment both horizontally and vertically. Units requiring the same size compartments shall be interchangeable. The assembly shall permit rearrangement of the units at a later date, such as replacing three single units with a single unit requiring three spaces, without cutting or welding.
- 2.1.5.2 Devices in the removable units shall be accessible from the front. Devices shall be mounted to permit normal maintenance and replacement of components of one compartment without interference with other compartments. No wiring except connections to stabs shall be located on the back of the removable units.
- 2.1.5.3 Doors shall be provided with an interlocking feature to prevent the opening of any door when the unit it houses is energized. The doors shall be provided with a defeater mechanism to permit authorized personnel to unlatch and open the door while the operating lever is in the "On" position. Operating handles shall clearly indicate the "On" and "Off" positions of the circuit breakers.

- 2.1.5.4 Power contacts shall open and close all phases simultaneously. Minimum starter size shall be NEMA size 1.
- 2.1.5.5 Each starter shall have the quantity of auxiliary contacts indicated on Attachment B. The contacts shall be rated heavy duty in accordance with NEMA ICS 2. All auxiliary contacts, except those used to perform functions within the removable unit, shall be wired to the terminal boards in accordance with Attachment B.
- 2.1.6 Circuit Breakers
- 2.1.6.1 Circuit breakers shall be enclosed in a phenolic or similar nonconducting case and in accordance with NEMA AB 1 and UL 489. Circuit breakers shall be rated for 65 KA interrupting rating with trip rating as shown on Attachment A.
- 2.1.6.2 Circuit breakers shall be operated by a toggle mechanism of the quick-make, quick-break type and shall be entirely trip free. Each breaker shall open all phases and shall trip all poles simultaneously. All breakers not part of a combination starter shall be equipped with thermal magnetic trip units. Breakers shall have 150 amp minimum frame size and be rated 600 volts.
- 2.1.6.3 Provide means for padlocking circuit breakers with at least one padlock in the "ON" position and three padlocks in the "OFF" position, with the door closed.
- 2.1.6.4 Combination starters shall have motor circuit protector (MCP) type circuit breakers through NEMA Size 5 with multiple trip settings, minimum of five settings.
- 2.1.7 Overload Relays
- 2.1.7.1 Bimetallic, eutectic alloy overload elements or adjustable current sensing solid state trip devices shall be provided for all phase conductors. Eutectic alloy elements shall be of thin film type construction. It shall be possible to reset the overload relays without opening the compartment doors. Overload relay elements shall be provided on all phase conductors. Overload relays shall be ambient-compensated and based on table 430-150 of NFPA 70, the National Electrical Code.
- 2.1.7.2 The overload trip setting shall be adjustable by minimum of +15 percent of the respective rating and shall be sized for 100 percent of motor full load currents with 1.15 motor service factor.
- 2.1.7.3 Each overload relay shall consist of three current sensing elements with one common contact.

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2.1.8 Relays

2.1.8.1 Relays, when required, shall have 120 vac 60 Hz rated coils and interchangeable contacts rated for 10 amps continuous at 120 vac. Westinghouse Type AR or equal.

2.1.9 Control Transformers

2.1.9.1 Control transformers shall be 480-120 volts and shall be mounted on the removable unit with no wiring behind the unit. One side of the secondary winding shall be fused, and the other side of the secondary shall be grounded. Transformers shall have both primary windings fused.

2.1.9.2 Control transformers shall be connected to alternate phases of control center power buses to provide balancing of single phase loads. Control transformers shall be one standard size larger than is required for control devices shown on Attachment B.

2.1.10 Fuses

Fuse clips shall have contact surface and spring tension to prevent heating or loosening of the fuses after continued operation or repeated removal and replacement.

2.1.11 Ammeters

Ammeters shall be provided at the MCC as shown on Attachment A. Ammeters shall be panelboard type with scale range to match current transformer ratios shown on Attachment A. Ammeters shall have 2 percent accuracy. Ammeter dial shall be white background with black markings mounted on the associated compartment door.

2.1.12 Current Transformers (CT)

CT's shall be provided with ratios as indicated on Attachment A. The CT's shall be window type installed in the combination starter unit. CT burden shall not be less than the instruments it is connected to.

2.1.13 Instrument Transducers (IT)

Transducers shall be supplied as indicated on Attachments A and B. Current transducers shall have 5 amp full scale input and 4-20 mA output. Transducer shall be self-sustaining type with no requirement for auxiliary voltage source. Transducer shall be mounted inside the removable unit.

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2.1.14 Pilot Devices

All pilot devices mounted in the motor control centers such as push buttons, selector switches and other such items shall be single unit construction heavy duty with contact arrangements as shown on Attachment B. Contacts shall be rated for minimum of 10 amps. "Start" push buttons shall have momentary contacts and "stop/pull reset" push button shall have maintained contacts.

2.1.15 Terminal Blocks

Pull-apart type terminal blocks shall be provided and numbered as shown on Attachment B and shall be mounted at an accessible location. Terminal blocks shall have 20 percent spare terminals but not less than two points per each terminal block. All terminal blocks shall be clearly marked for control wiring connections, and shall be sufficiently removed or isolated from the buses to provide safe wiring separation with the buses energized. Terminal blocks shall be 600 volt molded barrier type with binding screws and with white marking strip. Terminal blocks shall be in accordance with NEMA ICS4 and UL 1059. Current transformers circuit terminal blocks shall be shorting type.

2.1.16 Connections to Bus

Bus to line-side connections of removable units for NEMA starter sizes up to and including Size 4 shall be stab type clips with silver plated contact surfaces. They shall make contact automatically upon inserting the unit and disconnect automatically upon removal of the unit. The stab assembly shall be separable from other components of the removable unit. The stab assembly shall be constructed so that line-to-line and line-to-ground short circuits will not be possible when a unit is being inserted or removed.

2.1.17 Wiring

2.1.17.1 Wiring between devices and terminal blocks shall be bundled, supported by straps and installed in a neat and tidy manner. Wiring shall not be festooned. Control wiring in the motor starter units shall be stranded copper conductors not less than #14 AWG. Power and current transformer wiring shall be #12 AWG minimum with flame retardant 600 volt, UL listed type RHH or THHN and 90°C minimum insulation in accordance with NFPA 70.

2.1.17.2 Control wiring shall be identified at each termination point utilizing embossed PVC sleeve type wire markers. Stick-on labels are not acceptable. Termination points shall not have more than two wires connected.



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2.1.17.3 Terminations shall use locking spade connectors such as Thomas and Betts "Sta-Kon or equal."

2.1.17.4 Unit connection diagrams shall be permanently attached inside of each unit door before shipping.

2.1.18 Space Heaters

Each vertical section of MCC shall contain thermostatically controlled 120 volt ac fused space heater to prevent moisture condensation. Space heaters shall be rated at 240 volt ac but shall operate at 120 volt for longer life. All heaters within each assembly shall be controlled by one single-pole circuit breaker located in the assembly. The entire circuit shall be wired to an accessible terminal block providing for a single connection of the external power source. Each space heater shall be easily accessible from the front of each unit.

2.1.19 Nameplates

2.1.19.1 Nameplates shall be furnished for the motor control center assembly, for each cubicle and for each starter component, as shown on Attachment A. The assembly nameplates shall be attached at the top front of the middle vertical section, and the unit nameplates shall be located on the front covers of the appropriate compartments. Attachment of nameplate shall be by means of self tapping screws. Rivets or sheet metal screws are not acceptable.

2.1.19.2 The nameplates shall be engraved phenolic. Phenolic nameplates shall be engraved to show black letters on white background. All cubicle nameplate lettering shall be a minimum of 3/16-inch high. Assembly nameplate lettering shall be a minimum of 3/4-inch high.

2.1.20 Finish

2.1.20.1 Parts to be painted shall have sharp edges broken and burrs removed and shall be thoroughly cleaned of rust, slag, oil, grease, or other foreign material. Steel parts not plated or galvanized, and all outside metal surfaces shall be painted with Seller's standard prime and finish paint.

2.2 FABRICATION AND MANUFACTURE

2.2.1 General

2.2.1.1 Seller shall provide a certified shop inspection and test report demonstrating equipment conformance to the requirements of this specification.

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2.2.2 Inspection

- 2.2.2.1 The equipment may be inspected at the factory by the Buyer's representative to assure compliance with the specifications, standards, and codes and any additional requirements listed in this specification and Attachments A and B.
- 2.2.2.2 Inspection by the Buyer and the manufacturer shall include, but not necessarily be limited to, the following items:
- 2.2.2.2.1 Assembly arrangement and dimensions for conformance with approved manufacturer's drawings.
- 2.2.2.2.2 Bus material, dimensions, ratings, insulation, phasing, short circuit bracing, silver or tin plating at joints and connections.
- 2.2.2.2.3 Ground bus material, sizes, continuity, ground lugs.
- 2.2.2.2.4 Nameplate type and color, contents, letter size, arrangement, mounting method.
- 2.2.2.2.5 Doors alignment, closing and latching.
- 2.2.2.2.6 Starter components, selector switches, push buttons, ammeters, transducers and terminal blocks.
- 2.2.2.2.7 Circuit breakers type, instantaneous or thermal-magnetic, current, voltage and short circuit ratings and padlocking provisions.
- 2.2.2.2.8 Contactors sizes, coil voltage ratings, number of auxiliary contacts, number of overloads.
- 2.2.2.2.9 Overload relays model and type, coil ratings, heater catalog numbers.
- 2.2.2.2.10 Control power transformer VA ratings, ratios, fuses.
- 2.2.2.2.11 Current transformers ratios, connections, voltage ratings.
- 2.2.2.2.12 Load terminals cable lug sizes.
- 2.2.2.2.13 Terminal block type, wire connections, terminal block markings, clearance for field wiring.
- 2.2.2.2.14 Auxiliary relays model, type, coil voltage ratings, pick-up and dropout characteristics, number and rating of contacts.

2.2.3 Testing

2.2.3.1 Testing shall be conducted and reported in accordance with NEMA Standards ICS 2, Part 322 and UL 845 and the procedures submitted by Seller.

2.2.3.2 The tests shall include, but not necessarily be limited to, the following items:

2.2.3.2.1 Insulation tests of all equipment, wiring and buses.

2.2.3.2.2 Circuit continuity and wiring.

2.2.3.2.3 Mechanical equipment adjustment and operation of all movable equipment and devices.

2.2.3.2.4 Demonstration that drawout equipment of same rating and voltage is completely interchangeable.

2.2.3.2.5 Electrical contact adjustments.

2.2.3.2.6 Integrity of all electrical connections with respect to continuity and mechanical tightness.

2.2.3.2.7 Correct operation of relays, energized at rated voltage and/or current.

2.2.4 Delivery

2.2.4.1 Provisions for Handling and Field Erection

2.2.4.1.1 Each shipping section of the stationary structures shall be furnished with removable lifting angles and/or plates suitable for crane hooks or slings.

2.2.4.1.2 Each shipping section shall be furnished with removable steel channel base plates which will permit using pipe rollers or dollies without damaging the frame steel of the equipment.

2.2.4.1.3 Seller shall supply standard matching color paint for field "touch-up" after installation of the equipment.

2.2.4.2 Shipping

2.2.4.2.1 Relays, current transformers, contactors and any other components having parts which may be damaged in transit, shall be securely blocked and braced to prevent damage during shipment.

2.2.4.2.2 Each shipping section shall be provided with a permanently attached, readily visible identification tag bearing the equipment number of the MCC assembly of which it is a part.

2.2.4.3 Preparation for Shipment

Preparation for shipment shall be in accordance with Seller's standards. The Buyer reserves the right to inspect and approve the equipment packaging prior to shipment.

**PART 3 EXECUTION**

(Not Used)

**END OF SECTION**

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U.S. DEPARTMENT OF ENERGY  
Hanford Waste Vitrification Plant  
Richland, Washington  
DOE Contract DE-AC06-86RL10838

## ATTACHMENT A

FLUOR DANIEL, INC.  
Advanced Technology Division  
Fluor Contract 8457

## MCC Components List

03/23/93

Motor Control Center MC-32A-205  
Rating - 600V, 3 Phase, 4 - Wire, 60Hz, 65 KA RMS Interruption  
Horizontal Bus - Phase Bus 600A and Neutral Bus 300A Bracing - 65kA  
Vertical Bus - 300A, Minimum  
Incoming Lugs - 2 - 500 kCMIL per Phase and Neutral  
- 2 - #1 AWG Ground

Specification No. B-595-P-P27A-16482  
Data Sheet No. P27A-DS-1  
Revision 1

ASSEMBLY/CUBICLE DOOR NAMEPLATE			EQUIP RATING	FULL LOAD CURRENT	STARTER UNIT		STARTER DIAG.	CT RATIO	BREAKER TRIP RATING	FEEDER SIZE AWG	GND WIRE AWG	* STARTER COMPONENT NAMEPLATES				
LINE 1	LINE 2	LINE 3			NEMA SIZE	TYPE						(A) AMMETER	(IT) TRANSDUCER	STOP/ PULL RESET	START	MAINT.-LOCAL- REMOTE
MC-32A-205	480 VOLT MCC	CANISTER STORAGE BLDG.														
480/277 VOLT	MAIN INCOMING LINE		600A													
AN-051-112	OPERATING AREA	EVAP. COOLER UNIT FAN BL-051-112	15 HP	21A	2	FVNR	C	40:5		#10	#10	11-CSS-037A-1	11-CSS-037-1	HS-CSS-037A-1	HS-CSS-037B-1	HS-CSS-037C-1
AN-051-111	OFFICE AREA AMU FAN	BL-051-111	3 HP	4.8A	1	FVNR	D			#12	#12			HS-CSS-007A	HS-CSS-007B	HS-CSS-007C
VP-620-003VA	HEALTH PROTECTION SYSTEM	VACUUM BLOWER	7.5 HP	11A	1	FVNR	C	25:5		#12	#12	11-VAX-022-1A	11-VAX-022-1	HS-VAX-022A-1	HS-VAX-022B-1	HS-VAX-022C-1
CU-051-111	OFFICE AREA	CONDENSING UNIT	11.0 KW	14.0A					20A	#12	#12					
EN-051-115	OFFICE AREA	ELECTRIC HEATER	2.5 KW	3.6A					20A	#12	#12					
EN-051-117	OFFICE AREA	ELECTRIC HEATER	7.5 KW	9.5A					20A	#12	#12					
UN-051-119	MECH. EQUIPMENT ROOM	UNIT HEATER	15 KW	19A					30A	#10	#10					
UN-051-121	OPERATING AREA	UNIT HEATER	10 KW	13A					20A	#12	#12					
UN-051-123	OPERATING AREA	UNIT HEATER	10 KW	13A					20A	#12	#12					
UN-051-125	OPERATING AREA	UNIT HEATER	10 KW	13A					20A	#12	#12					
UN-051-127	OPERATING AREA	UNIT HEATER	10 KW	13A					20A	#12	#12					
UN-051-129	OPERATING AREA	UNIT HEATER	10 KW	13A					20A	#12	#12					
UN-051-131	OPERATING AREA	UNIT HEATER	10 KW	13A					20A	#12	#12					
UN-051-133	OPERATING AREA	UNIT HEATER	10 KW	13A					20A	#12	#12					
DO-180-001	STORAGE DOOR	ASSEMBLY	2.2 KW	4.8A					20A	#12	#12					
LX-32A-215	LIGHTING PANEL "A"	480/277V	100A	30A					100A	# 2	#8					

U.S. DEPT. OF ENERGY  
Hanford W. Irrigation Plant  
Richland, Washington  
DOE Contract DE-AC06-86RL10838

## ATTACHMENT A

FLUOR DANIEL, INC.  
Advanced Technology Division  
Fluor Contract 8457

## MCC Components List

03/23/93

Motor Control Center MC-32A-205  
Rating - 600V, 3 Phase, 4 - Wire, 60Hz, 65 KA RMS Interruption  
Horizontal Bus - Phase Bus 600A and Neutral Bus 300A Bracing - 65kA  
Vertical Bus - 300A, Minimum  
Incoming Lugs - 2 - 500 kCMIL per Phase and Neutral  
- 2 - #1 AWG Ground

Specification No. B-595-P-P27A-16482  
Data Sheet No. P27A-DS-1  
Revision 1

ASSEMBLY/CUBICLE DOOR NAMEPLATE			EQUIP RATING	FULL LOAD CURRENT	STARTER UNIT		STARTER DIAG.	CT RATIO	BREAKER TRIP RATING	FEEDER SIZE AWG	GND WIRE AWG	* STARTER COMPONENT NAMEPLATES				
LINE 1	LINE 2	LINE 3			NERA SIZE	TYPE						(A) AMMETER	(IT) TRANSDUCER	STOP/ PULL RESET	START	MAINT.-LOCAL- REMOTE
WELDING	RECEPTACLE #1	EQUIPMENT ROOM	60A	45A					60A	# 4	#10					
SPARE STARTER					2	FVNR	C	40:5		#10	#10					
SPARE STARTER					1	FVNR	C	25:5		#10	#10					
SPARE STARTER					1	FVNR	D			#10	#10					
SPARE	CIRCUIT BREAKER								30A	#10	#10					
SPARE	CIRCUIT BREAKER								20A	#12	#12					
SPARE	CIRCUIT BREAKER								20A	#12	#12					
SPARE	CIRCUIT BREAKER								20A	#12	#12					
FUTURE STARTER	SPACE				2											
FUTURE STARTER	SPACE				1											
FUTURE STARTER	SPACE				1											
FUTURE 150 AF	CIRCUIT BREAKER	SPACE														
FUTURE 150 AF	CIRCUIT BREAKER	SPACE														
FUTURE 150 AF	CIRCUIT BREAKER	SPACE														

NOTES: \* 1. Starter Component Nameplates shall include the function ("Ammeter", "Stop/Pull Reset", etc.)  
and ID No. as shown in the table (II-CSS-037A-1, HS-CSS-037A-1, etc.)  
EXAMPLE: "AMMETER or "STOP/PULL RESET  
II-CSS-037A-1" HS-CSS-037A-1"

△ 2. Rev. 1 addition; UP-34A-601 and LX-32B-315

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U.S. DEPARTMENT OF ENERGY  
Hanford Waste Vitrification Plant  
Richland, Washington  
DOE Contract DE-AC06-86RL10638

## ATTACHMENT A

FLUOR DANIEL, INC.  
Advanced Technology Division  
Fluor Contract 8457

## MCC Components List

03/23/93

Motor Control Center MC-32B-205  
Rating - 600V, 3 Phase, 4 - Wire, 60Hz, 65 KA RMS Interruption  
Horizontal Bus - Phase Bus 600A and Neutral Bus 300A Bracing - 65kA  
Vertical Bus - 300A, Minimum  
Incoming Lugs - 2 - 500 kCMIL per Phase and Neutral  
- 2 - #1 AWG Ground

Specification No. B-595-P-P27A-16482  
Data Sheet No. P27A-DS-2  
Revision 1

ASSEMBLY/CUBICLE DOOR NAMEPLATE			EQUIP RATING	FULL LOAD CURRENT	STARTER UNIT		STARTER DIAG.	CT RATIO	BREAKER TRIP RATING	FEEDER SIZE AWG	GND WIRE AWG	* STARTER COMPONENT NAMEPLATES				
LINE 1	LINE 2	LINE 3			NEMA SIZE	TYPE						(A) AMMETER	(T) TRANSducer	STOP/ PULL RESET	START	MAINT.-LOCAL- REMOTE
MC-32B-205	480 VOLT MCC	CANISTER STORAGE BLDG.														
480/277 VOLT	MAIN INCOMING LINE		600A													
AN-051-113	OPERATION AREA	EVAP. COOLER UNIT FAN BL-051-113	15 HP	21A	2	FVNR	C	40:5		#10	#10	11-CSS-037A-2	1T-CSS-037-2	NS-CSS-037A-2	NS-CSS-037B-2	NS-CSS-037C-2
VP-620-003VB	HEALTH PROTECTION SYSTEM	VACUUM BLOWER	7.5 HP	11A	1	FVNR	C	25:5		#12	#12	11-VAX-022-2A	1T-VAX-022-2	NS-VAX-022A-2	NS-VAX-022B-2	NS-VAX-022C-2
EN-051-116	ELECTRIC EQUIPMENT ROOM	ELECTRIC HEATER	4 KW	3.6A					20A	#12	#12					
UN-051-118	MECH. EQUIPMENT ROOM	UNIT HEATER	15 KW	19A					30A	#10	#10					
UN-051-120	OPERATING AREA	UNIT HEATER	10 KW	13A					20A	#12	#12					
UN-051-122	OPERATING AREA	UNIT HEATER	10 KW	13A					20A	#12	#12					
UN-051-124	OPERATING AREA	UNIT HEATER	10 KW	13A					20A	#12	#12					
UN-051-126	OPERATING AREA	UNIT HEATER	10 KW	13A					20A	#12	#12					
UN-051-128	OPERATING AREA	UNIT HEATER	10 KW	13A					20A	#12	#12					
UN-051-130	OPERATING AREA	UNIT HEATER	10 KW	13A					20A	#12	#12					
UN-051-132	OPERATING AREA	UNIT HEATER	10 KW	13A					20A	#12	#12					
XT-32B-005	DISTR. PANEL "B" DA-32B-005	TRANSFORMER XT-32B-005	30 KVA	36A					60A	#4	#10					
LS-510-001	SEWAGE LIFT STATION		10.3KW	15.2A					30A	#10	#10					
UP-34A-601	UPS	NORMAL POWER SOURCE	15 KVA	18A					30A	#10	#10					



U.S. DEPARTMENT OF ENERGY  
Hanford Waste Vitrification Plant  
Richland, Washington  
DOE Contract DE-AC06-86RL10838

## ATTACHMENT A

FLUOR DANIEL, INC.  
Advanced Technology Division  
Fluor Contract 8457

03/23/93

## MCC Components List

Motor Control Center MC-32B-205  
Rating - 600V, 3 Phase, 4 - Wire, 60Hz, 65 KA RMS Interruption  
Horizontal Bus - Phase Bus 600A and Neutral Bus 300A Bracing - 65kA  
Vertical Bus - 300A, Minimum  
Incoming Lugs - 2 - 500 kCMIL per Phase and Neutral  
- 2 - #1 AWG Ground

Specification No. B-595-P-P27A-16482  
Data Sheet No. P27A-DS-2  
Revision 1

ASSEMBLY/CUBICLE DOOR NAMEPLATE			EQUIP RATING	FULL LOAD CURRENT	STARTER UNIT		STARTER DIAG.	CT RATIO	BREAKER TRIP RATING	FEEDER SIZE AWG	GND WIRE AWG	* STARTER COMPONENT NAMEPLATES				
LINE 1	LINE 2	LINE 3			NEMA SIZE	TYPE						(A) AMMETER	(IT) TRANSDUCER	STOP/ PULL RESET	START	MAINT.-LOCAL- REMOTE
LX-32B-315	POWER PANEL "D"	480Y/277V 3ø, 4W	100A	24A					100A	#2	#8					
WELDING	RECEPTACLE #2		60A	45A					60A	#4	#10					
SPARE STARTER					2	FVNR	C	40:5		#10	#10					
SPARE STARTER					1	FVNR	C	25:5		#10	#10					
SPARE STARTER					1	FVNR	D			#10	#10					
SPARE	CIRCUIT BREAKER								30A	#10	#10					
SPARE	CIRCUIT BREAKER								20A	#12	#12					
SPARE	CIRCUIT BREAKER								20A	#12	#12					
FUTURE STARTER	SPACE				2											
FUTURE STARTER	SPACE				1											
FUTURE STARTER	SPACE				1											
FUTURE 150 AF	BREAKER	SPACE														
FUTURE 150 AF	BREAKER	SPACE														
FUTURE 150 AF	BREAKER	SPACE														

NOTES: \* 1. Starter Component Nameplates shall include the function ("Ammeter", "Stop/Pull Reset", etc.)  
and ID No. as shown in the table (11-CSS-037A-1, HS-CSS-037A-1, etc.)  
EXAMPLE: "AMMETER" or "STOP/PULL RESET"  
11-CSS-037A-1" HS-CSS-037A-1"

2. Rev. 1 addition; UP-34A-601 and LX-32B-315





**FLUOR DANIEL**

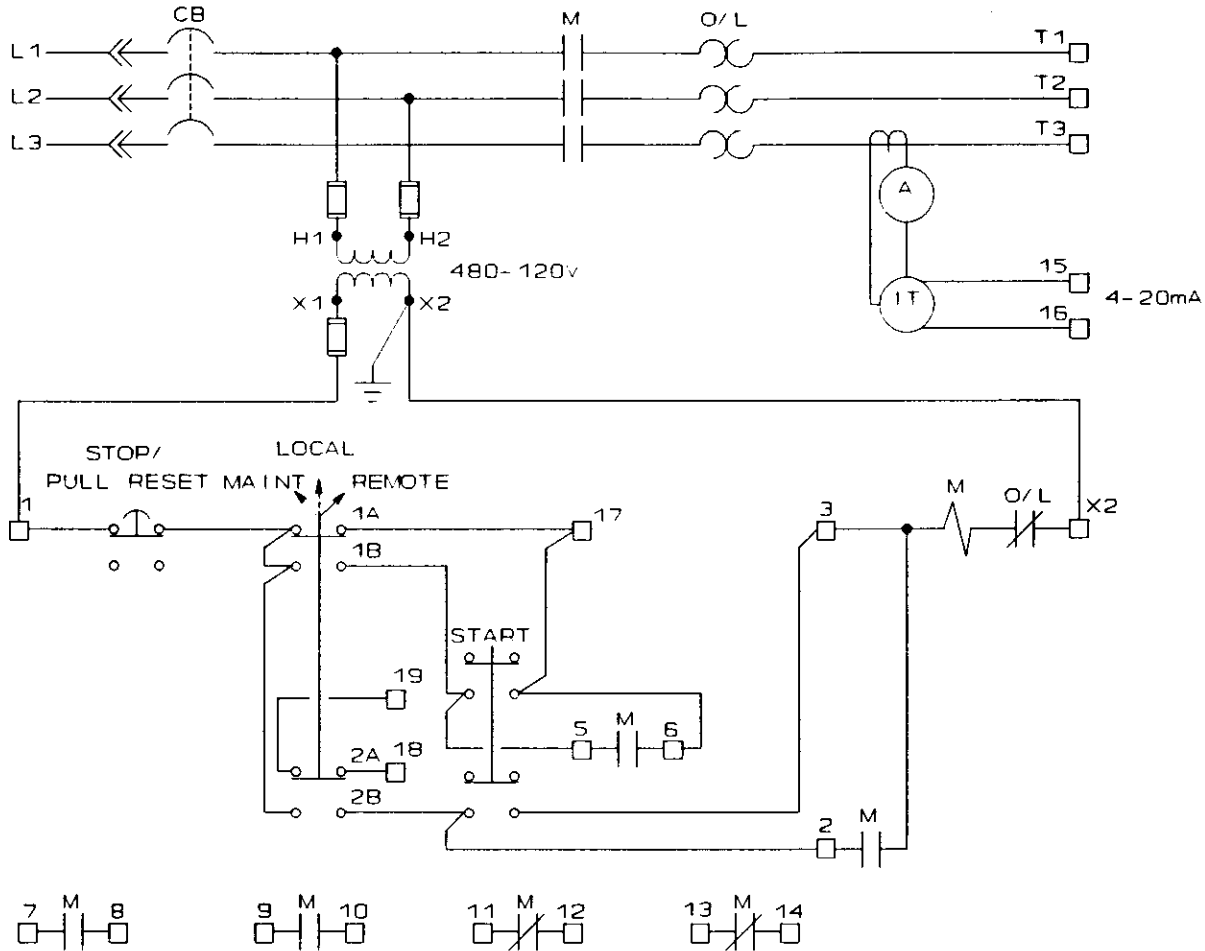
**ATTACHMENT B**

**DATA SHEET**

U.S. Department of Energy  
Hanford Waste Verification Plant  
Richland, Washington  
DOE Contract DE-AC06-86RL10838

**STARTER DIAGRAM 'C' FVNR, SIZE 1-4**

NO.	REV.	REVISION	SHEET NO.	REV.
DATE 03/23/93	CR-854		P27A-DS-1	1
			DATE 02-02-93	CONTRACT 845734
			ITEM NO.	N/A
			SECTION NO.	16482
			MCC NUMBER	
			ORIG BY CCS	CHK'D AT
				APPR'D



FOR SELECTOR SWITCH FUNCTION SEE SHT. # P27A-DS-3.

□ - TERMINAL BLOCK

FOR SWITCH, PUSHBUTTON, AMMETER (A) AND TRANSDUCER (T) IDENTIFICATION NO'S SEE ATTACHMENT 'A'.

AUXILIARY CONTACTS (TYP)



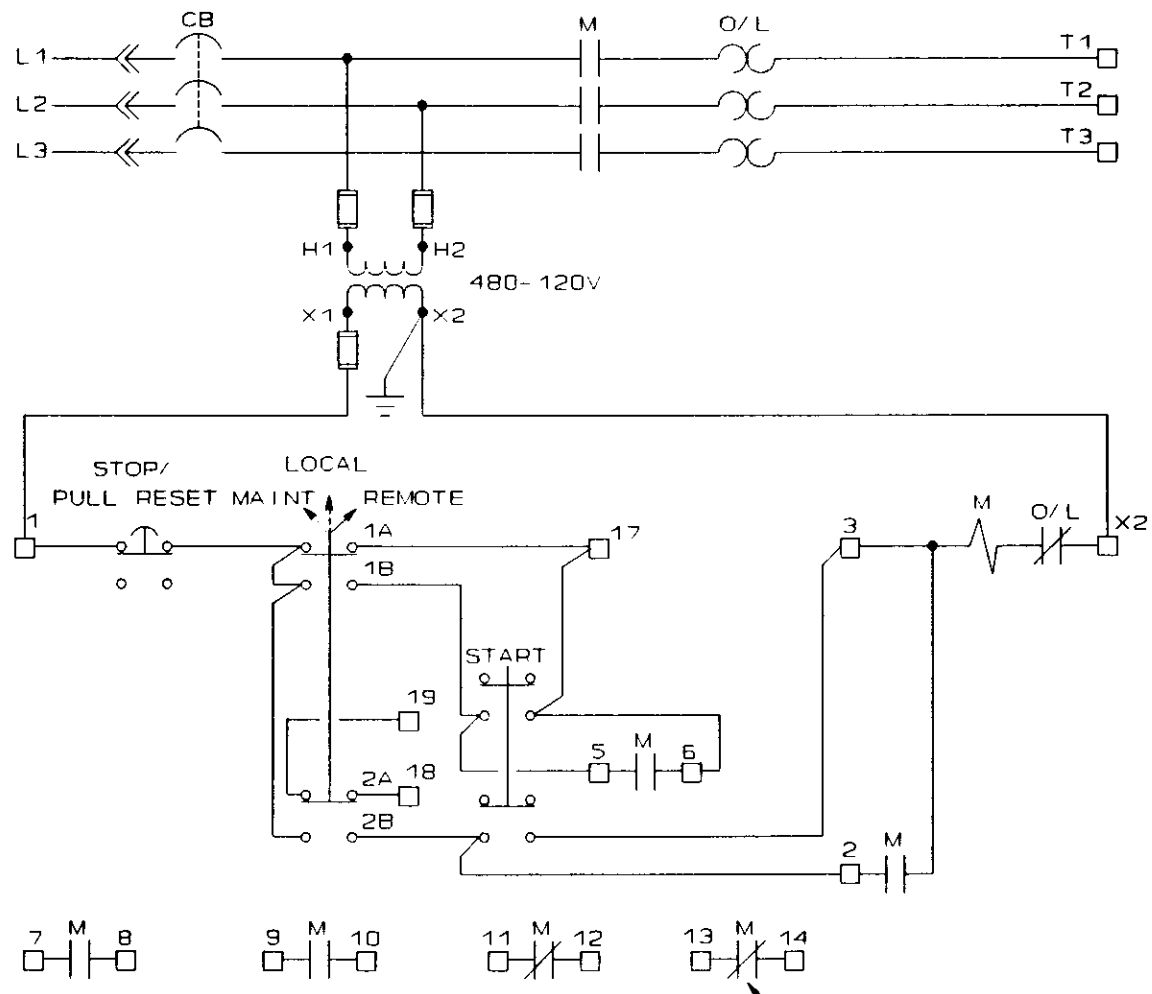
SAFETY CLASSIFICATION 3  
IMPACT LEVEL 3

**DATA SHEET**

U.S. Department of Energy  
Hanford Waste Verification Plant  
Richland, Washington  
DOE Contract DE-AC06-86RL10838

**STARTER DIAGRAM "D" FVNR, SIZE 1-4**

NO.	REV.	DATE	REVISION	SHEET NO.	REV.
1	1	03/23/93	CR-854	P27A-DS-2	1
2				DATE	CONTRACT
3				02-02-93	845734
4				ITEM NO.	N/A
5				SECTION NO.	
6				MCC NUMBER	16482
7				ORIG BY	CHK'D
8				CCS	AT
9				APPR'D	



FOR SELECTOR SWITCH FUNCTION SEE SHT. # P27A-DS-3.

□ - TERMINAL BLOCK

FOR SWITCH, PUSHBUTTON, AMMETER (A) AND TRANSDUCER (T) IDENTIFICATION NO.'S SEE ATTACHMENT "A"

AUXILIARY CONTACTS (TYP)

SAFETY CLASSIFICATION 3  
IMPACT LEVEL 3

# ATTACHMENT B



**FLUOR DANIEL**

## DATA SHEET

U.S. Department of Energy  
Hanford Waste Vitrification Plant  
Richland, Washington  
DOE Contract DE-AC06-86RL10838

## SELECTOR SWITCH FUNCTION TABLES

NO.	BY	REVISION	SHEET NO.	REV.
	DATE		<b>P27A-DS-3</b>	<b>1</b>
△	<b>CCS</b>	<b>No Change</b>	DATE	CONTRACT
	<b>03/23/93</b>		<b>02-02-93</b>	<b>845734</b>
△			ITEM NO.	
△			<b>N/A</b>	
△			SECTION NO.	
△			<b>16482</b>	
△			MCC NUMBER	
△			ORIG BY	CHK'D
△			<b>CCS</b>	<b>AT</b>
△			APPR'D	

## SELECTOR SWITCH FUNCTION

CONTACT LOCATION	MAINT	LOCAL	REMOTE
	POS 1 ↙	POS 2 ↑	POS 3 ↗
SIDE 1 A	O	O	X
B	O	X	O
SIDE 2 A	O	O	X
B	X	O	O

SAFETY CLASSIFICATION 3  
IMPACT LEVEL 3